

# EXHIBIT 28

## Q&A: Robert Stern sheds light on BU brain study -

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By Erik Brady, USA TODAY  
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*Dr. Robert Stern is co-director of the Center for the Study of Traumatic Encephalopathy at Boston University's School of Medicine. He talked with Erik Brady of USA TODAY after the center announced last week that former NHL enforcer Bob Probert had chronic traumatic encephalopathy. Probert died last summer at 45 and left his brain to science.*



By Vernon Doucette, Boston University Photography

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**Q: What can you tell us about the disease suffered by Bob Probert?**

A: The decision to make Bob Probert's findings public was his wife's. We really don't give a lot of details about these cases until they have already been published in a peer-reviewed journal. So I can't give a whole lot of details. I can say he did have CTE, but it wasn't as severe as many of the pro football players' brains that (the center) has studied.

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### **CONCUSSIONS: Stars' head injuries touch off debate**

**Q: What can you say about Probert in relation to Reggie Fleming, the other former NHL player who died at 73 in 2009 and also had CTE?**

A: Reg Fleming did have more severe disease. He also died at a much older age. And so it's hard to know the severity of his disease because he lived so much longer and we know the disease continues to progress as people get older.

**Q: What causes CTE?**

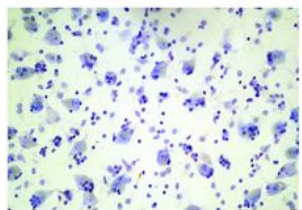
A: What we believe is that repetitive brain trauma is necessary for CTE to develop but it is not sufficient. Meaning, some people with repetitive brain trauma get the disease and some don't. So there must be other factors that put people at greater risk for developing the disease or not developing the disease, such as genetics or other environmental or biological factors. So the key is that we believe repetitive brain trauma does bring about the disease, but that's not the only variable required. There must be something else that makes one person more susceptible to getting the disease than another. Repetitive brain trauma is not just concussions — symptomatic concussions — but may also include repetitive sub-concussive or asymptomatic blows to the head.

**Q: Probert suffered from substance abuse and he was in a car accident. Could those things contribute to CTE?**

A: There is no scientific evidence to date that substance abuse or steroid use has any impact on the development of CTE. Having a motor vehicle accident where there is head trauma, that could definitely play a role in the development, but as far as we know a single traumatic brain injury from a motor vehicle accident would not be sufficient to bring about the disease. It's the repetitive nature of the brain trauma.

**Q: Collisions in hockey come at greater speeds than in football. Does speed and force play a role in CTE?**

A: We just don't know. Those are such important questions that need to be answered. Questions of severity of force that is sustained, the types of head trauma, whether it's direct acceleration type of trauma or rotational forces to the brain or is it not even related to the amount of force? Could it just be the repetitive nature of hits to head? If you think about linemen in football, who seem to be at high risk for developing this disease, they may not have those big-collision, symptomatic concussions. But every play of every game and every practice they are hitting their heads against their opponents. They may not have any symptoms at all at that point. But it could be that repetitive mild hits over and over again bring about the disease. But these are questions that still have to be answered.



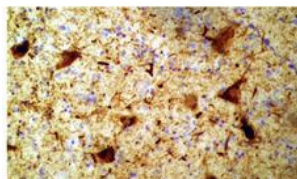
*This whole brain section and microscopic section of the brain are from a 65-year*

**Q: How about hits to the head from fighting in hockey? Probert and Fleming were both so-called enforcers.**

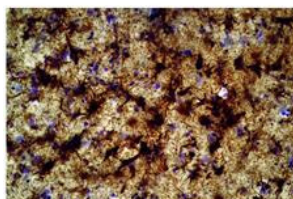
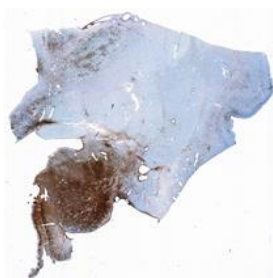
A: It definitely can't be ruled out. But when it comes to hockey, we really don't yet know whether it's the game itself, and the hits players take by playing the sport, and/or the hits to the head from fighting. So in the cases that we have examined, Reg Fleming and Bob Probert, they played in different eras of play. No helmet versus helmet. Size of players is different now versus before. Rules of the game have changed. But one thing they had in common was they were both enforcers, with Reg Fleming being one of the original enforcers and Bob Probert having the reputation of being one of the major enforcers of the game. That involves in Probert's case 200 to 300 fights in his professional career that likely involved a lot of trauma to the brain. But we have no idea just based on these two cases whether it's the

-old control subject with no abnormalities.

fighting or the blows to the head from playing the game or a combination of the two. Much more research is needed.



This whole brain section and microscopic section of the brain of former NFL offensive lineman John Grimsley, 45, show abundant tau protein in neurofibrillary tangles. Tau proteins stabilize microtubules. When they are defective, they can lead to dementia.



Center for the Study of Traumatic Encephalopathy

**Q: NHL general managers outlawed blind-side hits after last season. Should they eliminate straight-on hits to the head?**

A: In my opinion, we don't have enough scientific evidence of what causes CTE in hockey to make major changes to the game (but) if we understand that repeated brain trauma can lead to this disease, then anything we can do to make the game safer would be helpful. So whether any head hits should be illegal is beyond my ability to determine and it's a much bigger issue, but it's common sense that the more we can reduce trauma to the brain, the better off the brain is going to be.

This whole brain section and microscopic section of the brain of an unnamed 73-year-old former world champion boxer show end-stage CTE and dementia and very severe tau protein deposits. CTE is a progressive disease that worsens as a subject ages, and it does not show symptoms until the disease is already progressing.

**Q: Sidney Crosby took a big hit and a few days later what seemed a lesser one and has been out since. Does that fit into this notion of repetitive hits being a big problem?**

A: So that's two different things. One is the more acute effects of concussion and recovery from concussion, which is a separate thing from the development of CTE. CTE isn't where someone has had repetitive blows to the head and they keep getting more symptomatic and more symptomatic and they continue to get worse and they stop playing the game and they continue to get worse. With CTE, the symptoms can start years or decades after one stops hitting their head. And so it's a disease that gets set in motion earlier in life from the hits to the head. But it's not until it gets bad enough to be a progressive disease that they start showing symptoms. Whereas having to stop playing because of concussion symptoms is a different story but an equally important story. What we don't know is the link between the two. We do know that it is critical for people to rest and recover from concussions or they will potentially continue to have symptoms from the concussion, something called post-concussion syndrome. But what we don't know yet is the link between returning to play too quickly after a concussion and subsequent development of CTE. So, in other words, we know that it ain't good for you to return to play too quickly because it can have devastating effects on the brain and its ability to recover. But how that's related to the later development of CTE, we don't yet know.

**Q: Do you have other hockey players leaving their brains to you?**

A: We have many hockey players in our brain donation registry and longitudinal research program. Keith Primeau has made it public that he is a participant in our research. He's someone who stopped playing after many concussions. But right now I can't give you (other) names.

**Q: Leaving aside names, what are the numbers of players?**

A: We have 350 athletes of all different levels and all different sports who have agreed to donate their brains after they die and participate in our research each year while they're alive. Amongst that large group are both professional and collegiate and high school hockey players. But we need many more to participate in order to answer these important questions.

**Q: How many brains have been examined thus far?**

A: We have completed our examination of 14 professional football players. Dr. (Ann) McKee is the neuropathologist who does the brain examinations. Of those 14, 13 have been positive for CTE. Now, that doesn't mean that almost everyone who plays football is going to have CTE.

**Q: Because this is a self-selected group?**

And family-selected. But what if the next 86 cases that come in are negative? Which I hope they are, but don't think they will be. That would still be 13%, which is pretty high. So we don't know yet at all what the prevalence of CTE is among football players.

**Q: Given the 13 positive in football and two in hockey, any notion of who is at greater risk?**

A: Not yet. We need to do much more research, including prospective longitudinal research of people while they're alive to answer many of these questions. And a big area of focus of our research, especially my research, is to develop ways to diagnose CTE during life so we can better understand the risk factors, the prevalence and, very importantly, to develop ways to treat it and prevent it. And so right now, the only way to diagnose CTE is following death. So what's so critical at this point is coming up with ways to diagnose it while someone is alive so we can do the necessary scientific studies to eventually become able to treat it effectively.

**Q: How long does it take to study a brain after it is donated?**

A: Well, I can tell you what happens is Dr. McKee and her staff examines the brain extensively for CTE. I speak with family members and other important people who knew the person well to get an understanding of the person's history and symptoms through the years. And we also look at medical records, etcetera. After both of those processes are done, we will go over the results with the family members. So that's the process. The time differs depending on how busy everything is and how many brains we have and the complexity of the case. And so I can't give you a real time frame but it's months, not days or weeks, though it doesn't extend beyond a few months.

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